

National Aeronautics and Space Administration



goddardview

**Volume 7 Issue 3**

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## Diversity at Goddard: Goddard's Diversity and Inclusion Office

By Anetra M. Tucker

In the 2010 Government-wide Employee Viewpoint Survey, Goddard ranked second out of 224 Agency components in support for diversity, an impressive accomplishment on the Center's part. Goddard's efforts in this area are led by the Diversity and Inclusion (D&I) Office, which is housed within the Office of the Center Director.

The D&I Office was established to ensure diversity and inclusion among all groups and individuals at Goddard and its field centers (Wallops, IV&V, and GISS). The diversity efforts at Goddard focus on building an all-encompassing workforce where employees, and their thoughts and creativity are valued and can contribute to workforce trends. The D&I Office also takes an active and instrumental role in advocating diversity as more than just race and gender, but also age/generation, physical abilities, religion/spirituality, education, skill set, and sexual orientation.

Led by Special Assistant for Diversity, Sharon Wong (currently fulfilling a temporarily detail assignment at the U.S. Office of Personnel Management), Goddard's D&I Office is comprised of Kelly Farrell (Acting Special Assistant for Diversity), Special Assistant and Goddard Ombudsman Sheri T. Brown, and Program Manager Shavondalyn Givens. Together, these individuals manage Goddard's Diversity and Inclusion Programs such as the Diversity Council, Celebrate Goddard Day, Diversity Dialogue Project (DDP), the Power and Privilege Series, the Goddard Opportunities Bulletin Board System (GOBBS), and the Center's D&I Advisory Committees, which include the Gay, Lesbian, Bisexual, and Transgendered Advisory Committee; the Veteran's Advisory Committee; and the New Employee Welcoming Board.

The Diversity and Inclusion Office staff members held a Diversity Open House event on April 21, 2011. At this event, employees were invited to learn more and discuss current diversity efforts and trends that are occurring at Goddard, Wallops, IV&V, and GISS. A number of interesting topics were discussed at the open house including techniques and methods in which the D&I Office can consistently engage employees on diversity and inclusion topics and programs, education and awareness, providing accountability for diversity, and communication among employees.

"Diversity at Goddard" is a new series of Goddard View articles related to Goddard's diversity and inclusion programs, events, and educational awareness. The D&I Office welcomes feedback and suggestions from individuals on how to better engage employees about diversity and inclusion. For more information on Goddard's D&I Office and its programs, please visit: <http://diversity.gsfc.nasa.gov>. ■

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On the cover: Visitors play Earth science tic-tac-toe in the shadow of a Delta rocket at the Goddard Visitor Center.

Photo credit: NASA/Goddard/Bill Hrybyk

### GoddardView Info

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# Goddard Open House Attracts More Than 15,000 Visitors

By Robert Garner

Goddard hosted more than 15,000 visitors under gray but rain-free skies on May 14. The *Explore@NASA Goddard* event was the Center's first open house since 2008.

"We held Explore@NASA Goddard to show everyone all the impressive and important things NASA does," said Michelle Jones, of Goddard's Office of Communications. "We are incredibly fortunate to be able to do what we do on behalf of the American people, and we're excited to invite the public to see how we are improving life on Earth."

Goddard is a preeminent research center for Earth science and home to *Hubble Space Telescope* operations, as well as the upcoming *James Webb Space Telescope* and dozens of other missions that study our planet, our solar system and the universe. Exhibits on these subjects and many, many more entertained the day's guests.

Visitors met with NASA astronauts John Grunsfeld and Scott Altman, snapped photos of Darth Vader and other Star Wars characters, and took in live entertainment from The Chromatics, Sweet Honey in the Rock®, and other groups.



Photo credit: NASA/Goddard/Pat Izzo

*Caption: Commander Scott Altman autographs a picture for some fans.*

Tours included stops at Goddard's television studios, the Visitor Center for "Science on a Sphere" presentations, as well as Goddard's clean room and other satellite testing and construction facilities. "We got to see the James Webb [Space Telescope] mirror in the clean room," said Michelle Rosen, a mechanical engineering major at the University of Maryland. "That was awesome!"

Kids and their parents were able to construct their own satellites, rockets, and anything else in their imaginations, thanks to some 750,000 bricks (about a ton's worth) on loan from LEGO®.



Photo credit: NASA/Goddard/Pat Izzo

*Caption: Children of all ages got a chance to build the future with LEGO®.*

Yolanda Lawson and her three children were visiting Goddard for the first time. "The LEGOs took me back to when I was a kid," she said. "We loved it. We'll definitely be back." Yolanda's son Donte was working on a "creation for when you go into space."

The Goddard Mall was filled with food vendors, music, and science presentations and demonstrations. Tami J. and her son enjoyed the flight simulators and hovercraft on display from Traveling Space Museum, Inc. "I'm really impressed," she said. "We saw Sweet Honey in the Rock, which was amazing. My son's been on the moon bounce, like, five times. It's all amazing."



Photo credit: NASA/Goddard/Pat Izzo

*Caption: The space shuttle-shaped moon bounce was very popular.*

"It's an incredible feeling to see the culmination of hard work and months worth of planning come together in such a fantastic way," said Leslee Cork, of Goddard's Office of Communications. Cork led overall event organization efforts. "All the guests I spoke with mentioned that they were looking forward to our next open house. Knowing that these visitors enjoyed themselves is a reward in itself." ■



## 49<sup>th</sup> Robert H. Goddard Symposium: “NASA, an Agency of Imagination and Exploration”

By Michael Calabrese and Dewayne Washington

“NASA, More Than You Imagine” was the theme for the 49th Robert H. Goddard Memorial Symposium, held at the Greenbelt Marriott. This year’s theme provided an opportunity to reflect upon many of the other unique aspects of NASA and especially Goddard.

“Each year, the committee brainstorms for those topics of most relevance within the current aerospace environment,” said Dr. Harley Thronson, chair for the planning committee. “We think 2011 was one of our best.” The unique theme, great participants, and top keynote speakers were credited with compiling the longest list of attendees in recent memory.

Rob Strain, Goddard Center Director, talked in his opening remarks about the many Goddard Earth and space science missions that contribute to the mission of NASA. “The future looks good for Goddard as we continue our work of exploration,” said Strain. He then introduced the STS-31 pilot responsible for the delivery of the *Hubble Space Telescope* into orbit in 1990.

NASA Administrator Charlie Bolden reflected on the *Hubble* mission, which provided him an opportunity to work with Goddard and pilot a mission never before attempted. Before introducing the President’s Science Advisor, Bolden stated, “Dr. Robert Goddard would be truly amazed at the progress we’ve made in space since the first liquid fueled rocket flight.”



Caption: NASA Administrator introduces the president's Science Advisor, Dr. John Holdren.

Dr. Holdren thanked the Administrator and then acknowledged to the audience, “Charlie Bolden is a true American hero. We stand together at a turning point and face historic opportunities for advancing this Nation’s capabilities,” said Holdren, who is also the Director of the White House Office of Science and Technology Policy.

During his keynote address, Holdren added, “The perspective space offers allows us to see things *on* Earth that we can’t see *from* Earth.” He stressed the strategic importance of space to include national security capabilities and space technologies. “The President and I stand with you in pursuit of that future,” said Holdren.

Alan Ladwig, NASA Deputy Associate Administrator (AA) for Public Outreach, moderated the first panel discussion with five other NASA AAs. Their presentations revealed an ever-changing NASA already on an altered course to allow humans to again venture beyond Earth’s orbit to explore our universe. The AA panel represented NASA’s Exploration Systems, Human Exploration, Space Operations, Aeronautics Research, Science Missions, and Mission Support.

Throughout the symposium, several NASA speakers, including the Administrator, talked about a Space Launch System (SLS) and a Multi Purpose Crew Vehicle (MPCV); a confirmation that NASA is moving forward following the cancellation of *Constellation*.

During lunch, William Wrobel, Director of Wallops Flight Facility, presented an ever-increasing launch portfolio that will establish the facility as another major gateway into space. The assorted missions include airborne science, small satellite launches, and preparations for their first Taurus II launch scheduled for later this year. Also at lunch, Frank Slazer, American Astronautical Society (AAS) president presented AAS awards to James Bagian, Clayton Mowry, and Patti Grace Smith. Peggy Finarelli was presented the 2011 Award for the Advancement of International Cooperation.

The afternoon session included reflections as Roger Launius, senior curator of the Smithsonian Institute’s Air and Space Museum, presented “How We Got Where We are: 40 Years of Planning.” He spoke about the space race to the Moon, development of the space shuttle and construction of the *International Space Station*. He asked, “What do we do for an encore?” Walt Faulconer, President of Strategic Space Solutions next moderated a panel discussion recognizing Yuri Gagarin’s 50th anniversary and the future of human spaceflight.

Other highlights of the day included NASA’s “Three Chiefs: Technology, Science, and Engineering,” moderated by Warren Ferster, Editor-in-Chief of *Space News*, discussing the importance of “game-changing technology.” They also talked about the importance of maximizing the science return on taxpayers’ investment to provide the public a greater understanding of NASA as a science agency.

At the end of the first day, Charles Elachi, Director of the Jet Propulsion Laboratory and Vice President of the California Institute of Technology, was presented the Carl Sagan Memorial Award. This award is given to an individual who has demonstrated leadership in research or policies advancing exploration of the cosmos. It is presented in cooperation with The Planetary Society and sponsored by the Science Applications International Corporation (SAIC).

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## 49<sup>th</sup> Robert H. Goddard Symposium

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Photo credit: NASA/Goddard/Palazzo

*Caption: Goddard television producer Michael Starobin explains NASA material in 3D to Administrator Bolden.*

To open the second day, keynote speaker Dr. Steve Squires, Goldwin Smith Professor of Astronomy at Cornell University, presented the National Academy of Science vision for planetary science in the decade 2012–2022. He explained the process, the missions studied, and recommendations.

The “Protecting Our Home” panel discussion followed, led by Christyl Johnson, Deputy Center Director for Science and Technology at Goddard. William Murtagh, Program Coordinator, NOAA Space Weather Prediction Center, explained the Agency’s growing support for space weather services.

During the lunchtime presentation, David Neyland, Director of Tactical Technology Office at the Defense Advanced Research Projects Agency (DARPA), discussed an ambitious joint mission with Goddard to study the feasibility of satellite servicing missions.

The afternoon sessions featured two panel discussions: “Partnerships That Matter” and “Commercial Spaceflight to LEO.” Key comments included recognition of the *International Space Station* as an example of an international interdependency and the growth of a commercial space structure with NASA as the anchor. This panel was very interactive and informative, “Probably one of the best interactive panels we have ever had,” said Thronson.

In his wrap-up remarks for the symposium, Robert Burke, Northrop Grumman Aerospace Systems Vice President, expressed a need for space programs to be better planned and executed if we want to continue to make our dreams of space exploration a reality. He also recognized the human passion for future space exploration, which was demonstrated by a large contingent of University of Illinois students in attendance.

“This year’s Goddard Memorial Symposium exceeded all our expectations, and the audience feedback was uniformly positive,” said Jim Kirkpatrick, Executive Director, AAS, and host of the symposium. “And once again much of the credit goes to the outstanding support of the Goddard Space Flight Center. The relationships between AAS and Goddard is unique, and results in an annual event that truly benefits the space community.”

Videos of the presentations and the power point presentations are available at the AAS web site: <http://www.astronautical.org>. ■

## Webb Space Telescope ISIM on ‘Spin Cycle’

By Rob Gutro

Prior to taking a new telescope into space, engineers must put the spacecraft and its instruments through a “spin cycle” test for durability to ensure they’ll still work after experiencing the forces of a rocket launch. Finding out they don’t work once they’re in orbit is too late. The structure that houses the science instruments of the *James Webb Space Telescope* is undergoing that cycle of tests during the weeks of May 23 and 30 at Goddard. This structure is called the Integrated Science Instrument Module, or ISIM.

The *Webb Telescope* will experience significant shaking and gravitational forces when it is launched on the large Ariane V rocket. The ISIM structure will house the four main scientific instruments of the telescope.

During the testing process, as the ISIM structure is being spun and shaken, engineers take measurements to compare with their computer models. If there are discrepancies, the engineers hunt for the reasons so they can address them. The huge centrifuge will spin at speeds close to 11 rpm, exposing the ISIM structure to about 10 times the force of gravity.

*Webb* is the successor to the *Hubble Space Telescope* and will serve thousands of astronomers worldwide. *Webb* will study the history of our Universe, ranging from the first luminous glows after the Big Bang, to the formation of planetary systems capable of supporting life on planets like Earth, to the evolution of our own Solar System. The *Webb Telescope* is a joint mission of NASA, the European Space Agency, and Canadian Space Agency. ■



Photo credit: NASA/Goddard/Katie Lilly

*Caption: The ISIM structure being loaded onto the centrifuge*

## NASA is Making Hot, Way Cool

By Lori Keesey

The more advanced the electronics, the more power they use. The more power they use, the hotter they get. The hotter they get, the more likely they'll overheat. It doesn't take a rocket scientist to understand what typically happens next: the electronics fry.

In the world of electronics, thermal control is always one of the limiting factors—particularly in space where there is no air to help cool down electronic components.

Jeffrey Didion, a thermal engineer at Goddard, and Dr. Jamal Seyed-Yagoobi, a professor at the Illinois Institute of Technology in Chicago, Ill., have collaborated to develop a technology that may overcome current limitations. They have formed technical partnerships with the U.S. Air Force and National Renewable Energy Laboratory to address thermal-control concerns.

Called electrohydrodynamic (EHD)-based thermal control, the technology promises to make it easier and more efficient to remove heat from small spaces—a particular challenge for engineers building advanced space instruments and microprocessors that could fail if the heat they generate is not removed.

"Today, higher-power computer chips are available, but they generate too much heat," said Didion, who is leading the technology-development effort also involving Matthew Showalter, Associate Branch Chief of Goddard's Advanced Manufacturing Branch, and Mario Martins of Edge Space Systems, an engineering company specializing in thermal systems in Glenelg, Md. "If I can carry away more heat, engineers will be able to use higher-power components. In other words, they will be able to do more things."



Photo credit: NASA

*Caption: Close-up of pump being tested on a Terrier-Improved Orion sounding rocket mission from the Wallops Flight Facility in June.*

The project, a joint activity between Goddard and its partners, received support from the Goddard Internal Research and Development (IRAD) program, which funds the development of promising new technologies that could advance NASA's scientific and exploration goals. It is being demonstrated in June on a Terrier-Improved Orion sounding rocket mission, which also is flying the Small Rocket/Spacecraft Technology (SMART) platform, a microsatellite also developed at Goddard. This new microsatellite measures about 16 inches in diameter and was specifically designed to give scientific users less expensive access to space.

The main objective of the EHD demonstration is showing that a prototype pump can withstand the extreme launch loads as the rocket lifts off and hurtles toward space. Should it survive the vibration, the technology will have achieved a major milestone in its development, Didion said. It will mean that it is at or near operational status, making it a viable technology for use on spaceflight instruments.

"Any electronic device that generates a lot of heat is going to benefit from this technology," said Ted Swanson, Assistant Chief for technology for Goddard's Mechanical Systems Division. This could include everything from sensors flown in space to those used in automobiles and aircraft.

The technology promises significant advantages over more traditional cooling techniques. Unlike current technologies used by instrument and component developers, EHD does not rely on mechanical pumps and other moving parts. Instead, it uses electric fields to pump coolant through tiny ducts inside a thermal cold plate. From there, the waste heat is dumped onto a radiator and dispersed far from heat-sensitive circuitry that must operate within certain temperature ranges. "Its architecture, therefore, is relatively straightforward," Didion said. Electrodes apply the voltage that pushes the coolant through the ducts.

"The advantages are many," he added. "Without mechanical parts, the system is lighter and consumes less power, roughly half a watt. But perhaps more importantly, the system can be scaled to different sizes, from larger cold plates to microscale electronic components and lab-on-a-chip devices."

In addition to flying the technology on the sounding rocket mission, the EHD development team will fly a prototype EHD cold plate as an experiment on the *International Space Station* in 2013. "This effort will demonstrate the long-term operation of an EHD thermal-control system," Didion said.

In the meantime, the team is continuing its work to further advance EHD, Didion said. The team is working with Goddard detector engineer Timothy Miller to develop EHD pumps in microchannels that are etched onto silicon wafers. They plan to further experiment with other substrate and composite materials as well as special micro-fabrication techniques and coatings to create smaller, more robust EHD pumps.

These multifunctional devices could be used as stand-alone, off-the-shelf components ideal for quick-turnaround spacecraft—a capability that particularly interests the Air Force—or as units embedded within the walls of the electronic device.

The next step is placing the technology on circuit cards, with the ultimate goal of scaling it to the chip level where the ducts would be no larger than 100 microns (0.0039 inch), or about the width of a human hair. "The point is that you want to place the thermal-control unit closer to the source of heat," Didion said. "This would be a lot more efficient at eliminating waste heat." ■

# Growing Up at Goddard: Shuttle Small Payloads Launched Careers of Many at Goddard

By Karl Hille

Airlines cannot afford to fly with empty seats very often—and Space Shuttle orbiters can't leave valuable payload capacity "on the ground." Costing hundreds of millions of dollars per flight, NASA filled extra space in the shuttle's cargo bay using the Shuttle Small Payloads Project (SSPP).

Hooks and power buses built into the shuttle bays allowed hundreds of small, modular experiments and technology test units to make the best use of missions that didn't need all 50,000 pounds of payload capacity. Between 1982 and 2003, more than 200 of these projects, including Get-Away Special (GAS) Canisters, Hitchhikers, and Spartans, flew in 108 missions.

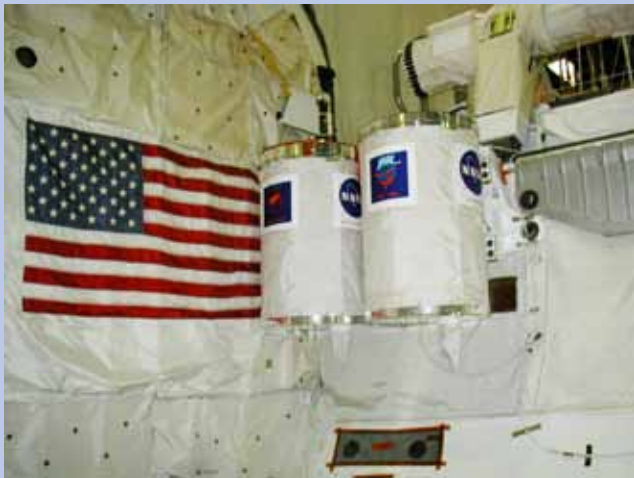


Photo credit: NASA

*Caption: Get-Away Special Canister payloads await launch installed in a shuttle cargo bay.*

The program offered an invaluable proving ground for science and technology as well as for a large contingent of young scientists and engineers who came to Goddard in the early 1980s and grew up here working with small payloads. The Shuttle Small Payloads Project became one of NASA's most fertile nurturing grounds as well as one of NASA's most economically and technically successful programs. Many of these investigators rose to positions of authority, shaping the course of NASA science and exploration.

"Back then, the SSPP and the other projects in the Special Payloads Division (SPD) operated in a skunk-works type of atmosphere," said Gerry Daelemans, now Project Formulations Manager for the Earth Science Program Office and *Landsat 9*. "Young people gravitated to it. There were a lot of different projects in the SPD—we had the original Small Explorers (SMEX) Project, the Shuttle-based Spartan Project, the PegSat Project. A lot of people got a lot of really good engineering and management experience in a short period of time. There was a lot of cross-fertilization of training on a lot of different small and quick missions, all of which flew in less than three years. Today, nobody would dream of that."

Many missions could be approved to fly in two years from conception—mere months for a second flight if the experimenter was ready, Daelemans said. "You could risk failing, because if you did, we could just re-fly you."

## To Earth Orbit—and Beyond

In the mid 1980s, Dr. James Garvin, a fresh-faced geoscientist from Brown University, flew laser ranging Light Detection and Ranging (LIDAR) equipment aboard aircraft out of NASA's Wallops Flight Facility. Systems he helped design graphed the meter-scale topography of Mars, the Moon, and Mercury.

However, to get the more detailed data needed to learn how to assess landing sites and surfaces of other planets; he needed to experiment with LIDAR in Earth orbit.

"Mapping Mars allowed us to have confidence to fly these kinds of missions," Garvin said of the Shuttle Laser Altimeter missions (SLA I and SLA II: Jan. 1996 and Aug. 1997). "What it did for us was show what we could actually do for Earth science."

Using leftover equipment from the Mars Orbiting Laser Altimeter project, the SLA team integrated a wave-form analyzer, allowing scientists to glean significant new data from individual backscattered photons, rather than from the bulk of the returned light.

He got his chance in 1996 aboard STS-72 on *Endeavour*. Their first topographic profiles showed the peak of Mauna Kea, Hawaii, one of the largest volcanoes on earth.

Later, Garvin and the SLA team noticed peculiar surface height distributions in the data. "We started getting these booming echoes that turned out to be the tops of trees, and smaller returns from the ground underneath," he said. "We realized we could use this method to measure the biomass of the planet." Individual signals teased out of the apparent noise also allowed them to measure the difference between glacier top surfaces and the ground beneath—technology and methods adapted for the IceSat-1 and Operation Ice Bridge missions.

"The legacy of those experiments was the proving ground for what we have since accomplished in developing these LIDAR instruments for other planets," Garvin said. "Everyone who worked on this project went on to really make a contribution to science."

## Beyond Technology – Growing Up at Goddard

Small payloads work exposed many Goddard engineers and managers to the larger Agency, said Joann Baker. She started in 1983 working with Get Away Special (GAS) canisters.

"It was exciting because I got to go integrate payloads in the actual Shuttle bay. I learned a lot about safety. I presented safety information to the broader Agency. We got a lot of inter-Center interaction that way," she said.

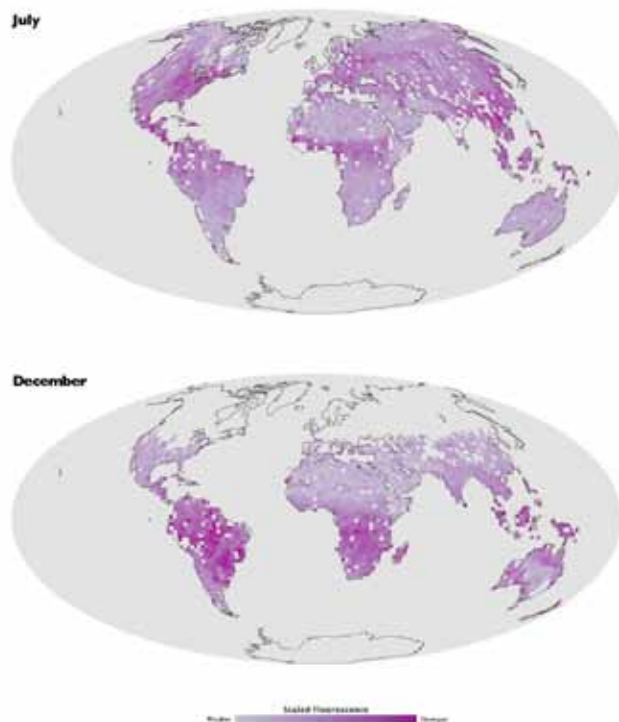
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## First-of-its-Kind Fluorescence Map Offers a New View of the World's Land Plants

By Adam Voiland

Scientists from Goddard have produced groundbreaking global maps of land plant fluorescence, a difficult-to-detect reddish glow that leaves emit as a byproduct of photosynthesis. While researchers have previously mapped how ocean-dwelling phytoplankton fluoresces, the new maps are the first to focus on land vegetation and to cover the entire globe.



*Caption: A first-of-a-kind global map of land plant fluorescence shows stronger photosynthetic activity in the Northern Hemisphere in July when light and temperature conditions were most conducive to plant growth, and the reverse in December. The maps are based on data from a spectrometer aboard the Japanese satellite GOSAT.*

To date, most satellite-derived information related to the health of vegetation has come from "greenness" indicators based on reflected rather than fluorescent light. Greenness typically decreases in the wake of droughts, frosts, or other events that limit photosynthesis and cause green leaves to die and change color.

However, there is a lag between what happens on the ground and what satellites can detect. It can take days—even weeks—before changes in greenness are apparent to satellites.

Chlorophyll fluorescence offers a more direct window into the inner workings of the photosynthetic machinery of plants from space. "With chlorophyll fluorescence, we should be able to tell immediately if plants are under environmental stress—before outward signs of browning or yellowing of leaves become visible," said Elizabeth Middleton, a Goddard-based biologist and a member of the team that created the maps.

The new maps, based on data collected in 2009 from a spectrometer aboard a Japanese satellite called the *Greenhouse Gases Observing Satellite* (GOSAT), show sharp contrasts in plant fluorescence between seasons. In the Northern Hemisphere, for example, fluorescence production peaked during July, while in the Southern Hemisphere it did in December.

The new findings help confirm previous lab and field experiments that suggest chlorophyll fluorescence should taper off in the fall as the abundance of green foliage declines and stress increases as a result of lower temperatures and less favorable light conditions.

While additional research is required to sort out the subtleties of the fluorescence signal, the new maps are significant as they demonstrate the feasibility of measuring fluorescence from space.

In the future, the Goddard team expects that fluorescence measurements will complement existing measures of "greenness" in a variety of ways. They could help farmers respond to extreme weather or make it easier for aid workers to detect and respond to famines. Fluorescence could also lead to breakthroughs in scientists' understanding of how carbon cycles through ecosystems—one of the key areas of uncertainty in climate science.

"What's exciting about this is that we've proven the concept," said Joanna Joiner, The Deputy Project Scientist for NASA's *Aura* mission and the leader of the Goddard team that created the maps. "The specific applications will come later."

### Glowing Plants?

The same mechanism that makes plants fluoresce causes a range of everyday objects—ground-up plant leaves, white shirts, jellyfish, and even blood and urine—to glow intensely under black light.

However, plants fluoresce in specific parts of the blue, green, red, and far-red spectrum. Chlorophyll fluorescence from green foliage, for example, is produced at the red and far-red wavelengths.

"In plants, fluorescence is not something that you can see with your naked eye because background light overwhelms it," explained Joiner, the lead author of the paper. When sunlight strikes a leaf, disc-like green structures called chloroplasts absorb most of the light and convert it into carbohydrates through photosynthesis.

Chloroplasts re-emit about two percent of incoming light at longer, redder wavelengths. This re-emitted light—fluorescent light—is what the Goddard scientists measured to create their map. Fluorescence is different than bioluminescence, the chemically-driven mechanism lightning bugs and many marine species use to glow without exposure to light.

Photo credit: NASA's Earth Observatory



## First-of-its-Kind Fluorescence Map Offers a New View

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For decades, scientists have measured fluorescence in plants by exposing leaves to laser beams that, like black light, make fluorescence more apparent. Such experiments have revealed much about how certain types of plants fluoresce, but researchers have not been able to use lasers to measure the phenomenon across broad swaths of the Earth's surface.

To create their global fluorescence map, Joiner and her colleagues used a different technique. They analyzed an unusually dark section of the infrared portion of the solar spectrum embedded within a feature called a "Fraunhofer line." There is little background light at the line they focused on—at about 770 nanometers—which made it possible to distinguish the faint fluorescence signal.

### The Future of Fluorescence

The new findings have implications for both current and upcoming satellite missions. In the near term, awareness of the fluorescence signal should help atmospheric scientists refine measurements of carbon dioxide and methane from the GOSAT mission.

The creation of the maps also bolsters the argument that an experimental mission being developed by the European Space Agency (ESA)—the Fluorescence Explorer (FLEX) mission—would make significant breakthroughs. The ESA is currently in the midst of feasibility studies and has not yet set a launch date for FLEX.

The findings also suggest that NASA's *Orbiting Carbon Observatory-2* (OCO-2), a mission that is designed to measure carbon dioxide levels much like GOSAT, should be able to make useful fluorescence measurements on a global scale. OCO 2 will launch no earlier than February of 2013 from Vandenberg Air Force Base in California.

The maps, published online in the journal *Biogeosciences*, represent just a first attempt to detect terrestrial fluorescence on a broad scale and will be enhanced and expanded over time, the scientists involved in the project emphasized.

For example, more work needs to be done to understand how plant fluorescence varies depending on light conditions. In strong afternoon light, the conditions in which GOSAT made its observations, unstressed plants produce a stronger fluorescence signal than stressed plants. To complicating matters, the reverse is true in the morning or evening when light is less intense.

To disentangle the two opposing effects, the Goddard-based group plans to continue refining the mathematical methods they used to calculate fluorescence. Meanwhile, groups of scientists at NASA's Jet Propulsion Laboratory in Pasadena, Calif., as well as Japanese and European research groups, are in the process of honing similar fluorescence-monitoring methods. ■

## Three Satellites See Eruption of Puyehue-Cordón Volcano

By Rob Gutro

NASA's *Terra* satellite, the GOES-13, and GOES-11 satellites all captured images of the ash plume from southern Chile's Puyehue-Cordón Volcano this week. The volcano is located in Puyehue National Park in the Andes of Ranco Province of Chile.

The *Terra* satellite flew over the volcano on June 6. The Moderate Resolution Imaging Spectroradiometer (MODIS) instrument captured a visible image of the eruption that showed the large ash plume blowing northeast, then to the southeast and over the Atlantic Ocean. The ash plume went at least as high as six miles on June 4 when it erupted, according to CNN International. Some 3,500 people were evacuated.

The *Geostationary Operational Environmental Satellites*, called GOES-13 and GOES-11, also captured images of the volcano from a different vantage point in space that revealed the plume was visible from even farther away.

GOES-13 monitors the eastern U.S. and the Atlantic Ocean, while GOES-11 monitors the western U.S. and eastern Pacific Ocean. The GOES-11 satellite image, taken from the farthest vantage point of any of the satellites, still showed the triangular-shaped plume, even from its position over the western U.S., despite the large distance.

The GOES satellites are managed by NOAA, and imagery and animations are created with the GOES satellite data at NASA's GOES Project located at Goddard. ■



Photo credit: NASA Goddard/MODIS Rapid Response Team

*Caption: This image of the eruption of the Puyehue-Cordón Caulle volcano, Chile was captured by the MODIS instrument on NASA's Terra satellite on June 6. The volcano is to the left center of the image and the ash plume is blowing northeast, then turns to the southeast and moves over the Atlantic Ocean.*

## i am goddard: Scott Webb

By Christina Coleman

With 21 years at Goddard under his belt, Scott Webb is no stranger to diversity within the Agency. He has witnessed not only a major technological transformation, but a welcome increase of manpower in his branch at Wallops Flight Facility, where he has been since working as a Co-Op student in 1990. In the IT and Communications Branch, where he serves as the Branch Head, he has seen the office grow from four individuals to a team of 30. So it is not surprising that, over time, Webb has adopted some surefire practices to ensure the success of his area and his employees.



*Caption: Scott Webb.*

"We are in a service organization and in order for the Agency to be successful we have to provide basic IT support to meet Agency goals and mission requirements. I see it as a foundation that is critical. Basically, we are enablers of NASA's mission and help to promote the continued success of Wallops," Webb said.

"I believe in the Federal Government and I love the shore," Webb said about Wallops Flight Facility, which is the only NASA-owned operational flight and test facility. "I believe in empowering the workforce. Micromanaging to me is a major pitfall in an organization. Allow them [the workforce] to make decisions and take ownership."

And because dealing with thirty different personalities, budget cuts, and challenging customers can potentially be risky, Webb understands the gift of basic communication between manager and employee.

"I try to apply this at home as well. I believe in open communication. I believe in honesty and integrity, and I believe in humility. And I believe in giving credit where credit is due," Webb said. "All I do is manage and try

to utilize the workforce and resources given to me. Sometimes it's a puzzle trying to put the pieces together. But the key to us being successful is understanding our customers and their requirements, understanding our capabilities, and how we can best serve the customers," he added.

By modeling respect for others and valuing the contributions of all, Webb contributes to the "i am goddard" campaign by being aware of the diversity of his group, and taking into account all of their ideas and contributions to make sure his team performs at its best. Webb also makes sure to model respect for his Branch everyday by celebrating their successes and acknowledging their ideas as well as their mistakes.

Working through the issues together as a group without excluding himself, he believes, is a surefire way to right wrongs, improve service to customers, and empower people to succeed.

"You've got to be conscious of what you say and when you say it and realize that it's not about me, it's about the workforce, when we do something right it's not 'me,' it's 'we,'" he said. "When there is a problem, we need to see how we can fix it. Sometimes people problems are harder to solve than technical problems. If it is a people problem, I tell my workforce, 'Let's turn the cheek, let's move forward and keep the big picture as your focus.' I let them know that there will be failures because we are not perfect. I tell them to learn from them and pick themselves up and move ahead. I'll be there to provide support and guidance, to help them understand what they did wrong, and to give them the opportunity to make things right."

Webb's managing practices don't just come in handy when dealing with his Branch at Wallops; it is also a way to make sure the soccer and baseball teams he coaches work together as a team. Outside of IT and communications, Webb can also be found helping organizations provide athletic facilities to the youth in the rural area in which he lives. "I believe in the youth, it's one of the greatest recourses this Nation has," Webb said.

In addition, Webb has been on two missions with his church to assist areas in need; most recently traveling to New Orleans to help restore and build houses. He also spends his time with his family and working on an aqua farming business he started with his father and brother 15 years ago, harvesting little neck clams.

Webb makes sure to use the "encourage, recognize, and respect" model with people he encounters in all aspects of his life. From coaching to managing and fishing, he believes in the power of a team, especially at work, where it matters the most to get the job done.

"I've got a great work force, I can't say enough about my workforce's abilities and their commitment to NASA and Wallops. I try to commend them and reward them as much as I can," he added. ■

## Growing Up at Goddard

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These opportunities and responsibilities boosted the career trajectories of many Goddard leaders.

"That was a powerful experience. It gave me a lot of confidence and experience that in other larger, more structured organizations would have taken many more years to garner that level of experience," said Craig Tooley. He calls his start as a mechanical engineer in the Special Payloads Division at Goddard in 1983 the "luckiest thing" that ever happened to him. "We were kind of thrust into it."

He went on to manage the *Lunar Reconnaissance Orbiter* mission and is now the Magnetospheric Multiscale (MMS) mission Flight Project Manager.

The program was also open to students and institutions outside NASA, and many of those investigators drew big achievements from their small payloads, said Dr. Ruthan Lewis, who helped manage multiple SSPP missions.

"Engaging and inspiring students was very exciting," she said. "To watch these students start from near zero experience, and just see their wonderment, their sense of, 'Wow, I flew my experiment in space, and I learned so much from it.' That was just incredible."

Goddard engineers and managers are working to ensure low-cost access to space for science and technology payloads remains an Agency priority.

"Once a program matures and requirements get established, it's difficult to introduce new ideas," Lewis said. ■

## "Webb 3-D Telescope Tour" Up for FWA Web Site Award

By Rob Gutro

A recent animated fly-by tour of NASA's upcoming *James Webb Space Telescope* is up for consideration of an "FWA" award. The animation was created by a team of visualizers at Goddard to highlight the next generation space telescope.

FWA, or Favourite Website Awards, is an industry-recognized internet award program and inspirational portal. According to their Web site, FWA is called "One of the world's leading recognition Web sites" and is widely known as the number one achievement for innovative Web design. The Favourite Web site Awards was created to recognize the latest and best cutting edge creativity and is based in England.

The FWA added the "Webb Space Telescope 3D Tour" to their public short-list on March 16, 2011 and is still accepting votes.

The *Webb* interactive utilizes cutting-edge Flash® and 3-D interactivity through an engine for Flash® called Away 3D®. Models of this complexity are rarely truly interactive, and this one comes at the start of a trend that will bring true 3D interactivity to the Web via Flash®.

The interactive fly-by tour was created to allow people to get familiar with the *Hubble Space Telescope's* successor. For years, NASA and contractors have been brainstorming, designing, building, and testing various components of the telescope—infrared cameras, a massive multi-layer sunshield, 18 mirror segments—that will allow the *Webb* to peer deeper than ever into the cosmos.

The interactive feature was conceived and designed by Michael McClare, Senior Media Producer at Goddard, who led a team of advanced Web designers, programmers, and animators. The team includes: Kris Meister, Director, Alien Communication, Washington, D.C.; Tyler Chase, Animator, University of Maryland Baltimore County, Md.; Katie Lewis, Web designer, NASA Goddard/University of Maryland Baltimore County, Md.

To add your comments for an FWA vote, visit:  
<http://thefwa.com/shortlist/webb-space-telescope-3d-tour>.

To see the *Webb Telescope* Interactive, visit: <http://www.nasa.gov/externalflash/webb3d>.

For more information about the *James Webb Space Telescope*, visit:  
<http://www.jwst.nasa.gov>. ■



## OutsideGoddard: One Dog at a Time

By Elizabeth M. Jarrell

Shortly before moving into their home in 2000, systems engineer Amy Pergosky and her husband contacted the Mid Atlantic German Shepherd Rescue (MAGSR) to adopt two dogs. MAGSR led them to two older German Shepherd Dogs who were sisters. Even though both dogs were heartworm positive and had bad hips, the Pergoskys adopted them. They had the dogs treated for heartworm, an expensive and often dangerous proposition. A year later, while preparing for the girls' hip replacement surgeries, they learned that one girl's back end was riddled with BB pellets. One dog succumbed to a previously undetected cancer two months after hip surgery, but the other lived to be almost 16.

The Pergoskys currently live with three adopted dogs. "I got into rescue because I wanted to thank the group which had pointed us to our girls."



*Caption: Pergosky and her three charges: Cayucos, Chekotah, and Aiyana.*

At first, Pergosky assisted with adoption events, taking available dogs to large pet stores looking for suitable homes. She soon began making home visits to evaluate an applicant's suitability. Says Pergosky, "The whole family has to be there because we want to make sure that everybody wants this dog in their home as part of their family." By 2002, Pergosky was MAGSR president. "It became a second full-time job," she says. "I wasn't going to bed until 3:00 a.m. After three years, I became a victim of rescue burn out."

She took a two-year break to raise her two young rescue dogs and care for her remaining older rescue dog. Despite needing a break, neighbors contacted them all the time with questions about dogs. In 2005, a neighbor told them about a stray dog in the area. The Pergoskys found the dog and arranged for animal control to take him to the Prince George's County Animal Shelter. "I called a few days later and found out that nobody had come for him so they had put him to sleep. It broke my heart. That was the catalyst that made me resume rescue work, this time at the Prince George's County Animal Shelter." She remains there still today.

Her first day at the shelter was a hard one. She watched an owner surrender his older dog who reminded her of her girls. Because the dog was an owner-surrender, she was put down that day. Remembers Pergosky, "I

saw them bring her body out to the freezer. They just carried out the body without any cover. I tried not to look and tried to keep the dog I was walking from looking. I relive things like this in my head all the time."

Most purebreds have affiliated rescue groups and some all-breed rescue groups also exist. These rescue groups work very closely with local animal shelters to take their respective purebreds out of the shelters and into foster homes. She knows that a rescue group has to be run differently from a shelter because the rescue group can keep a dog longer. "A shelter is just heartbreaking. You see all these dogs begging for attention, a walk, or just a treat and I'm only one person," says Pergosky. Mindful of emotional burnout, she developed a system of friends, including her husband, who understand and do this kind of work side by side with her. She has found a balance between her rescue work and the rest of her life. Says Pergosky, "It is easy to get burned out because you want to do so much and there is never any end. The dogs keep coming in. You need to realize that you cannot save them all."

There are days when she goes home and just prays for strength. Says Pergosky, "I've learned that even when there is a dip, a high point is coming shortly like hearing happy news from an adoptive family or that a rescue group has pulled a favorite dog from the shelter." She has also accepted that she can only do so much, which is how, she believes, she protects against another emotional burnout. "Every time I am able to help a dog, I am inspired by that last dog to try to help another. It is a dog-by-dog process," says Pergosky.

She now also assists with temperament testing for a Siberian Husky Rescue group. A temperament test involves finding out what a dog will and will not tolerate. It takes about fifteen minutes. "We do things that a veterinarian or an owner would do and then look for the dog's reaction and triggers," explains Pergosky. "Rescue groups typically cannot take dogs with bad temperaments that show aggression towards people or other dogs. These are two different kinds of aggression."

Her advice for owners of new dogs? "Make them part of your family. Train and socialize them, set house rules and boundaries, and keep them healthy," says Pergosky. "You can and should do this even if you adopt an older dog. Keep socializing them, taking them out to meet other people, other dogs, and generally exposing them to life." She further cautions, "If your new dog has an issue, immediately contact the rescue group or your veterinarian to ask for help and to find a trainer." According to Pergosky, "Taking a pet you can no longer keep to the shelter should be the absolute last resort. You should first try to 'rehome' the pet yourself, maybe with a trusted friend or family member, and then try a rescue group."

Pergosky, despite her heroic efforts, remains haunted. She says, "It's the faces and knowing that some of them didn't get out. That's the hardest part. Sometimes it hurts, but I keep trying—one dog at a time." ■